River Lark – Lark Angling & Preservation Society

An advisory visit carried out by the Wild Trout Trust – December 2008

1. Introduction

This report is the output of a Wild Trout Trust advisory visit undertaken on the River Lark on the waters controlled by the Lark Angling and Preservation Society (LAPS). In all the Society controls approximately 12 miles of fishing and this report covers the top 4 miles of river which is reserved by the trout section for fly fishing.

The fishing club has been established for over one hundred years and more information can be obtained from their web site www.lark-angling.co.uk

As the LAPS controls such a large section of river it was decided to visit certain key areas where the Society felt that there were either issues that needed resolving, or that sites were potentially ripe for improvement.

In 2003 the WTT undertook an advisory visit (Appendix 1) which outlined measures for improving brown trout (*Salmo trutta*) habitat. The main recommendation in the report was to focus on narrowing the channel and increase water velocities at key locations. The importation of gravels to improve spawning conditions was also highlighted as a potentially useful measure.

In requesting further advice from the WTT the Society are keen to look at other sites under their control and to implement a programme of further habitat restoration.

The comments and recommendations made in this report are based on the observations of the Trust's Conservation Officer, Andy Thomas and discussions with Derek Murrow, Tim Taylor, John Anderson and Glen Smithson, all representing the angling society.

Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

2. Description of the fishery.

The Lark rises in a narrow band of late Cretaceous chalk. It drains northwest to the fens, whereas the majority of rivers rising on this area of chalk drain to the east coast (e.g. Waveney, Deben and Stour). However, in common with those rivers, the Lark's catchment has relatively low rainfall compared to the chalk streams of Southern England. resulting in comparatively low mean flow rates. Beyond the chalk headwaters, the Lark flows across a surface blanket of material that was deposited during the last half million years.

Long sections of the River Lark, including the reaches controlled by LAPS have been extensively modified in the past to facilitate navigation. Some of the history behind the construction and operation of the navigation can be found on

the East Anglian Waterways Association website at: www.eawa.co.uk . Like many navigations constructed during the Industrial Revolution, the Lark navigation became largely derelict with the development of the railways during the late Victorian era.

It is not clear how far upstream the navigation was constructed but the channel, on inspection, appeared to be heavily modified over long sections. Some additional channel re-sectioning and dredging has also been carried out during the post war years for land drainage and flood risk purposes. It is understood that property in the Mildenhall area is still considered to be at risk from flooding which has prompted the Environment Agency to commission a study on flood risk. The study proposes possible solutions that could potentially provide opportunities for some channel and flood plain restoration.

To add to the large scale channel modifications, the river on the trout section is further influenced by two large impoundments. Marstons Mill is located approximately halfway along the trout section but was not inspected during the site visit. This structure is in private ownership and the LAPS currently have very little influence over its operation. From inspections of the channel some 500m upstream of the mill it is obvious that is has a significant effect on available habitat. The Lark is a typical lowland chalk fed river with a correspondingly modest gradient. Any weir or impoundment will undoubtedly drown out potential habitats, particularly for brown brown trout. Mills and weirs temporarily increase upstream water depth but also radically reduce velocity, encouraging sediment accumulation until the extra depth is lost. Impoundments also fragment coarse and game fish populations by preventing migrations to spawning habitat.

On the bottom half of the fishery there is another large structure just downstream of Temple Bridge. This weir is a flow gauging weir of the “crump” design which can be notoriously difficult for fish to able to migrate through.

Flow gauging weir below Temple Bridge.

Any significant enhancements to habitat on the LAPS waters will eventually require some modifications to these two important structures. This will be discussed further below.

2.1 Downstream Lackford Bridge

The upstream boundary to the fishery is at the Lackford road bridge. A short distance upstream of the bridge there appeared to be good trout spawning and nursery habitat. This section is just outside the waters controlled by the LAPS. Reference was made to this habitat in the previous WTT advisory report.

From Lackford Bridge downstream the channel was comparatively wide with a mainly shallow glide habitat over a bed of soft silty sand with occasional thin gravels. Some beds of starwort *Callitriche sp*, were observed and it is understood that this channel can become very weeded during the summer months. On some of the shallow marginal sections there were also beds of water cress *Rorippa sp.* and clumps of marginal emergent vegetation including sedge *Carex sp.*

The LB is not controlled by LAPS and has fairly dense stands of tall trees in places; including crack willow *Salix fragilis* and poplar *Populas fastigiate*. There were also some good examples of the valuable goat willow, or sallow *Salix caprea.* This tree can provide much needed low scrubby marginal cover which is vital in providing fish with a refuge from predators and as a source of terrestrial food items, as well as being useful in moderating in-channel weed growth.

The RB, like much of the river, was high above the water level and hard in nature; indicating that it was probably made up of previously dredged river bed materials.

Poplar plantation in the background with marginal goat willows.

Throughout most of the reach the flow was smooth and laminar. Adult trout lying on glide habitat often require a very close bolt hole if they are to remain comfortable and "on station". It is possible that during the summer months weed beds provide sufficient cover to enable reasonable numbers of adult trout to lie up. This stretch could potentially hold more trout with the addition of a varied bed topography and provision of overhead cover.

Attempts have been made to promote more in-channel diversity through the introduction of current deflectors. Although useful, these appear to be quite small and are not really big enough to promote local scour and hence useful holding habitats for trout.

Smooth laminar flow over a sandy substrate. Note the small log deflector which is just visible.

At one point a large tree had fallen into the channel form the LB. This was radically pinching the channel and promoting local increases in water velocity as well as excellent cover from predators. The presence of fallen trees and large branches, usually referred to as large woody debris (LWD) has been shown to be extremely important in several respects:

- An increase in the variety of flow patterns, depths and localised velocities.
- Development of high in-channel physical habitat diversity
- Significant benefits to the control of run-off at the catchment scale. Woody Debris helps regulate the energy of running water by decreasing

the velocity during high flows. Thus the ‘travel time’ of water across the catchment is increased.

LWD is a general term referring to all wood naturally occurring in streams including branches, stumps and logs. Almost all LWD in streams and rivers is derived from trees located within the riparian corridor. Streams with adequate LWD tend to have greater habitat diversity, a natural meandering shape and greater resistance to high water events. Therefore LWD is an essential component of a healthy stream’s ecology and is beneficial by maintaining the diversity of biological communities and physical habitat.

Traditionally many land managers and riparian owners have treated LWD in streams as a nuisance and have removed it, often with uncertain consequences. This is often unnecessary and harmful: stream clearance can reduce the amount of organic material necessary to support the aquatic food web, remove vital in-stream habitats that fish will utilise for shelter and spawning and reduce the level of erosion resistance provided against high flows. In addition, LWD improves the stream structure by enhancing the substrate and diverting the stream current in such a way that pools and spawning riffles can develop. A stream with a heterogeneous substrate and pools and riffles is ideal for benthic (bottom dwelling) organisms as well as for fish species like wild trout. The Lark has a comparatively modest discharge and low gradient so may not always respond so quickly to the stimulus provided by LWD as it would on rivers with a steeper gradient but there is no doubt that strategically placed LWD could enhance habitat on this river.

A fallen tree near the top end of the fishery promoting good quality habitat.

This top section of the fishery has real potential for enhancement as highlighted in the 2003 report. Although it lies approximately 3 km upstream of Marstons Mill it is quite possible that it is still being influenced by the impoundment. It would be very useful to persuade the owners of the mill to completely pull or draw all gates over a twenty four hour period and monitor water levels and velocities further upstream. How far does it back up the river? This may be a difficult question to answer because the bed level has almost certainly been raised by sediment-accumulation.

If agreement could be reached to permanently lower the impoundment the river above would eventually recover and new in-channel and marginal habitats would develop with increased water velocities. During the WTT visit in 2003 the gates had been drawn for several months. This is not sufficient time for the river to recover which would take at least a year or two before the natural process of recovery would become evident. Initially the river bed would look awful, with a reduced depth and exposed muddy margins and bed. It may also be necessary to pinch the channel in places to encourage scouring of all the accumulated sediments. Patience and understanding of the process would be necessary but the eventual benefits would be well worth the wait.

Enhanced habitat could also be created on this top reach by promoting more in-channel LWD as discussed above. There is no shortage of available material adjacent to the LB and if permissions could be gained it would be sensible to drop and pin further trees into the channel. Wholesale narrowing of the RB using faggot bundles, as recommended in the 2003 report or log revetments would also enhance in-channel habitat.

Various techniques can be used to secure fallen trees to the margins. It is important to ensure that no additional flood risk is posed through trees breaking away during high flows and causing blockages at bridges and structures downstream. It is understood that the Lark does not suffer from big flood events so it is perfectly feasible to either “hinge” live trees into the channel or secure imported LWD to the banks and bed. A range of techniques are described in detail in the Wild Trout Trust’s Chalkstream Habitat Manual. These techniques would work even better if coupled with a local increase in water velocity promoted through a lowering of the Marsden Mill impoundment. If these techniques are being considered then consents and permissions may be required. Tree works should only ever be undertaken outside the bird nesting season and some of the marginal trees on this section were laden with ivy possibly making them valuable bat roosts.

Creating new spawning habitats through riffle creation was recommended for this top section in 2003. Enhancing conditions for spawning near the top of the fishery is a very sensible strategy. Care should be taken to avoid “drowning” existing spawning habitat that is located just upstream of Lackford Bridge. Details on how to create spawning habitat is discussed in the recommendations section.

Ivy clad trees should be left for bats

An old cattle drink with protective fencing

Adjacent land use did not appear to be an area of concern. Meadows adjacent to the RB have at some stage been used for grazing and it was evident that some protective measures to avoid damage to river margins had been put in place. Some light marginal trampling or “poaching” can sometimes promote good quality habitats in chalks stream environments by creating low soft berms that

locally pinch the channel, promoting enhanced in-channel habitat. This is particularly the case on heavily modified or dredged banks which are often too high and hard to promote the natural soft squishy margin favoured by a range of chalk stream plants and herbs. This is particularly important in promoting better quality fly life.

Stock control and bank poaching is a very emotive subject and a heavily grazed and poached bank is much worse than a bank with no fencing. That said, if stock densities can be managed then light grazing and poaching often promotes optimal marginal habitats on wild trout fisheries.

2.2 Temple Bridge

The next section of river inspected was upstream of Temple bridge. Despite the considerable impounding effect from the gauging weir located just downstream of Temple bridge, the river displayed some characteristics associated with a naturally functioning system. A nice riffle and glide was observed which appears to have been created some years ago by importing gravels.

In some chalk and limestone catchments river bed gravels can naturally calcify and cement together. This did not appear to be the case here with the gravels in the main part being loose and of a size suitable for trout spawning. The gravels did, however, contain a lot of silt and it would be valuable to clean this section at the end of the rod season. Gravel cleaning would undoubtedly give any subsequently-deposited eggs a much better chance of surviving to fry stage.

A lovely glide and spawning riffle adjacent to a low soft margin. Good trout habitat

Gravel cleaning on chalk streams can significantly improve the survival of trout eggs

Of all the sections inspected, this reach appeared to have the most diversity in terms of channel shape and bed topography. Further enhancements could be made with the introduction of some LWD onto some of the shallow gravel glides to help promote local scour and sort river bed gravels.

Enhanced lies for adult trout could also be created through some selective tree planting using goat willow whips.

Good channel shape could be complemented with some low marginal cover dotted throughout this reach

Downstream of Temple Bridge and below the gauging weir the river was very deep and slow flowing. This section looks to have been heavily modified and has failed to make any significant recovery. Approximately 300 metres further downstream the river shallows slightly and there are some proposals to work with the local Environment Agency in creating some better quality habitats through the introduction of current deflectors. This section of river lies adjacent to the Tuddenham Heath Site of Special Scientific Interest on the LB and the Icklingham Plains on the RB which is the subject of a potential flood plain improvement scheme.

I have not been able to find details of the SSSI citation from the Natural England website but from studying the map it would appear that part of the Tuddenham Heath site is fen habitat and therefore very much reliant on water levels. Maintaining high water levels to protect valuable flood plain habitats may scupper any proposals to reduce the impoundments although both objectives can be met by wholesale bed replacement. This would be very expensive and probably beyond the scope of any project that could be delivered by the Angling Society on its own.

A heavily modified section downstream of the gauging weir. This section is in desperate need of some in-channel features and marginal tree cover to improve its fish holding capacity.

2.3 Cavernham Mill Stream

The last site inspected was in the middle of the fishery at the site known locally as the Three Bridges. The main channel here is hugely influenced by the impoundment at Marstons Mill. Wild fish are occasionally caught on this section and they are thought to drop out of the Cavernham Mill Stream which joins the LB of the main river approximately 600m upstream of the bridges.

The Cavenham Mill Stream is certainly a very exciting prospect. An inspection of the bottom 300m would suggest that this stream already has habitat capable of sustaining wild trout and could be enhanced further to improve production and provide wild stock for the main River Lark.

Good quality trout spawning habitat on the Cavenham Mill Stream

From my brief inspection it was difficult to quantify the amount of available habitat but in certain locations where there was enough access to inspect the stream it appeared to have a good morphology of pool, glide and riffle over a nice gravel substrate. The addition of some pieces of LWD to locally scour the gravels and provide in-channel cover would further enhance the quality of habitat available. In all the Cavenham Mill Stream flows for approximately 4 km and could potentially contribute a significant number of trout to the main fishery.

Where the Mill Stream joins the main Lark the habitat for trout is rather less inspiring. The river is very wide and slow flowing and it is understood that the river was dredged comparatively recently. For long sections downstream of the confluence there was a shallow silt bank extending out into the channel before dropping away into deeper water. Any reduction in head loss at the Marsden Mill

will almost certainly expose this silt bank and enable it to be planted up and consolidated with marginal emergent plants. This will naturally narrow the river and elevate water velocities through the main channel and potentially enable better quality habitats to form.

Just downstream of the Cavenham Mill Stream confluence. The shallow silt bank extends to about a third of the way across the channel and can just be made out.

A good example of habitat being created by a fallen tree. Habitat like this must be preserved and if possible created elsewhere throughout the fishery.

It is a legal requirement that some works to the river may require written Environment Agency consent prior to undertaking any works, either in-channel or within 8 metres of the bank. Any modifications to hard defences will require a land drainage consent on any river designated as "main river". Advice can be obtained from the Development Control Officer.

3. Conclusions

It is the author's opinion that the trout fishery on the river Lark could be significantly improved with a programme of habitat enhancement works. The river will never be a purely wild trout fishery capable of sustaining the current level of angling activity but improvements to habitat will not only increase the opportunities for wild fish but will also enable the LAPS to get the best return on any hatchery derived fish that are currently stocked.

It is understood that the club currently stock with fertile diploid fish. There is mounting evidence that interbreeding between domesticated farmed trout and wild fish can lead to lower fitness and survival amongst the offspring, reducing the numbers of river-bred fish in the population. Recent changes to the Environment Agency's National Trout & Grayling Strategy reflect this concern, and by 2015 all farmed trout stocked to rivers will be required to be sterile all-female triploids, or derived from local broodstock.

The Cavenham mill stream does have the potential to drip wild stocks into the system. It would be unfortunate if fertile hatchery derived fish were continually migrating up into this good quality habitat and restricting the wild component from reaching its full potential.

More information on this subject can be found at:

http://www.environment-agency.gov.uk/subjects/fish/165773/1791055/1800027/

The two water level control structures at Marstons Mill and below Temple Bridge have a huge impact on this river and are the key in any major river restoration plan. The section above the gauging weir appears to have a reasonable gradient despite the presence of the gauging weir, but it would be so much better if the weir was lowered or removed. This possibility should be flagged to the Environment Agency at every opportunity. There are alternatives to measuring flows rather than using the old fashioned crump weir. Removing this weir and replacing the method of gauging would be very expensive, but if the EA are serious about rivers meeting their targets under the European Water Framework Directive then tacking these big capital projects must be a priority and one which the Society should lobby for and actively support.

Without inspecting the structure at Marstons Mill it is impossible to make specific recommendations. Located as it is, right in the middle of the fishery it would

appear to be highly significant. It may be possible to negotiate with the owners and alter operating agreements that will potentially bring about major improvements to habitat and connectivity of fish populations.

The top section of river below Lackford Bridge is ripe for improvement by narrowing using faggots and by using LWD. Negotiate with the adjacent landowner and use some of the readily available material to winch whole trees or sections into the channel and peg into position. Guidance on how to do this is given in the Chalkstream Habitat Manual or some assistance can given via a WTT Practical visit where the techniques can be demonstrated. More information on PVs is given below.

On some of other more featureless sections of river the Society should introduce LWD to promote enhanced in-channel habitats, it was also apparent that there was a lack of low scrubby marginal cover. Implementing a programme of planting with small goat willow whips a few inches above normal water level should soon provide some good quality holding water for both stocked and wild fish.

The location and potential quality of the Cavenham Mill Stream is highly significant. Efforts should be made to assess the quantity and availability of this habitat for trout migrating up and down the system. Natural debris dams are rarely a block to free migration, whereas man-made or engineered dams may well be restricting the range of habitat availability. Potential spawning gravels, particularly on the bottom half of this little stream, should be improved either using LWD to locally scour and sort gravels or through a programme of gravel cleaning using high pressure pumps or leaf blowers.

Maintaining good quality water is essential on a trout fishery and even more so on sections where spawning would be expected. It is possible that Cavenham Mill Stream is not on any official EA monitoring programme. An approach to the EA to identify if there are any monitoring sites local to you would be wise. The presence or absence of certain pollution intolerant macro-invertebrate species is a very effective way of monitoring the quality of the water. It is recommended that perhaps one or two volunteers consider undertaking some simple training in order that a regular assessment of local water quality can be made. To this end WTT recommends that fisheries register their interest in taking part in the Riverfly Partnership monitoring and training initiative. The initiative aims to support fishing clubs and river owners to monitor and help conserve the environment. More details can be found on www.riverflies.org

Apart from the Cavenham Mill Stream and a handful of riffles there is very little spawning and nursery habitat available on the main Lark. It may be possible to create new spawning habitats through the introduction of imported gravels. It was noted that there were gravel pits located in the vicinity that would presumably have access to a compatible mix of river valley gravels ideal for trout spawning. Creating at least one good sized spawning riffle at the top end of the fishery should be a priority action. Care should be taken not to drown out the existing habitat located just upstream of your water.

Any new spawning riffle should be at least 20m long and have a depth of gravel of at least 30cm with the aim of ending up with a normal summer water depth of approximately 25cm.

The principle is to line the bed initially with large flint rejects and stone and then top dress with mixed angular river gravels of 15 to 50 mm. Ideally the riffle should have a gentle downstream slope. Alternatively, having a gentle ramp up to (approximately) the front third of the riffle and then a gentle slope down over the remainder also works well. The riffle should be very slightly dished in the centre. However, in reality the gravels are often relocated following the first spate. This should not be a concern on a straight run where generally the material will lock and settle into a natural looking riffle.

Construction of spawning riffles will require the assistance of a specialist contractor and hydraulic excavator.

Further information on enhancing existing spawning gravels or introuducing new gravels can be found in the WTT's Chalkstream Habitat Manual which is available on request from the WTT Office.

4. Recommendations

- Retain as much LWD within the channel as possible. Adopt a policy of retaining LWD in the river channel wherever possible. The West Country Rivers Trust provides a useful guide to the management of natural LWD:

1. Is the debris fixed, if yes then continue to 2, if not continue to 5.

2. Is the debris causing excess erosion by redirecting the current into a vulnerable bank? If yes then go to 5 if not then go to 3.

3. Would fish be able to migrate past it (take into account high river flows). If yes got to 4, if no go to 5.

4. **Retain the woody debris in the river**.

5. **Re-position or extract the debris.**

Note: If the debris dam needs to be removed but there is still a significant amount of the root system attached to the bank then it is recommended that the stump be retained for its wildlife habitat value and its stabilising effect on the bank.

- Open up a dialogue with the Environment Agency over the current use and life span of the gauging weir. Flag up the potential for its removal in making a significant contribution towards the river meeting good ecological condition targets under the EC Water Framework Directive.

- Open up a dialogue with the Environment Agency and the owners of the Marstons Mill and ask for an assessment of its ability to pass migrating

fish stocks and explore possible changes to the current operating arrangements. Suggest a trial lowering of the upstream levels and monitor the backwater effect.

- Instigate an autumn programme of spawning gravel enhancements. Identify the main areas of potential spawning activity and during October give those areas a thorough clean using high pressure pumps or a leaf blower.

- Consider the possibility of enhancing the productivity of the fishery by creating new spawning habitat with imported gravels.

- Keep a watching brief on water quality through joining the Riverfly Partnership and undertaking some monitoring of key areas. This might be particularly pertinent on the Mill Stream.

- Draw up a programme of improving in-channel habitats through the use of imported LWD and narrowing wide shallow sections using faggot or log revetments. Priority sites are downstream of Lackford Bridge, downstream of the gauging weir and downstream of the Cavenham Mill Stream confluence.

5. Making it happen

There is the possibility that the WTT could help to start an enhancement programme. Physical enhancement works could be kick-started with the assistance of a WTT 'Practical Visit' (PV). PV's typically comprise a 1-3 day visit where an approved WTT 'Wet-Work' experts will complete a demonstration plot on the site to be restored. This will enable project leaders and teams to obtain on the ground training regarding the appropriate use of conservation techniques and materials, including Health & Safety equipment and requirements. This will then give projects the strongest possible start leading to successful completion of aims and objectives.

The WTT can fund the cost of labour (two/ three man team) and materials (max £1800). Recipients will be expected to cover travel and accommodation expenses of the contractor.

Alternatively the Trust may be able to help in the development of possible project plans for the creation of new spawning and nursery habitats.

There is currently a big demand for practical assistance and the WTT has to prioritise exactly where it can deploy its limited resources. The Trust is always available to provide free advice and help to clubs, syndicates and landowners through guidance and linking them up with others that have had experience in improving trout fisheries.

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